CARLETON UNIVERSITY
Department of Civil and Environmental Engineering

CIVE 5204 F – Advanced Steel Structures **Fall 2018**
Time: Thursday 6:00–9:00
Place: 279 UC

Instructor: Khoo, H.A. **Room 3364 ME**
Phone 520-2600 Ext. 5798 **heng.khoo@carleton.ca**
Office Hour: **Open Door Policy**

Objective: This course is intended as an advance course on the theory and behaviour of steel structures. Only a few selected topics on steel structures will be discussed in this course.

Course Outline:

1. Design Philosophy and Material Properties
2. Tension Members
3. In-plane Differential Equation
4. Torsion
   St. Venant Torsion, warping torsion of W-section, solution of torsion problems
5. Second Order Differential Equation
6. Axially Loaded Columns
   Elastic and inelastic buckling theories, effect of residual stress and initial curvature, local buckling
7. Beams
   Review of local buckling, plastic action and moment redistribution, lateral buckling, inelastic effects
8. Beam-Columns
   In-plane behaviour, behaviour in the inelastic range, ultimate strength and stability, interaction equations, twist buckling, local buckling
9. Connections
   High-strength bolts and welds, installation, behaviour and inspection, axially loaded connections, eccentrically loaded connections, moment connections

Marking:

Assignments:	40%
Final Exam:	60%

Notes:

Requests for Academic Accommodation

You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: **carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf**

Religious obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: **carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf**

Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608 or pmc@carleton.ca for a formal evaluation or contact your PMC coordinator to send your instructor your Letter of Accommodation at the beginning of the term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. **carleton.ca/pmc**

Survivors of Sexual Violence

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and is survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: **carleton.ca/sexual-violence-support**

Accommodation for Student Activities

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. **https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf**

For more information on academic accommodation, please contact the departmental administrator or visit: **students.carleton.ca/course-outline**

The instructor may modify the outline during the term as the course progress.
You are required to submit your own work for Homework. See the institutional policy on the academic integrity (https://carleton.ca/registrar/academic-integrity/).
Final examination is for evaluation purposes only and will not be returned to the student.

Textbooks:

1. Kulak and Grondin, (2016). *Limit States Design in Structural Steel*. 10th Edition, Canadian Institute of Steel Construction, Toronto.
2. CISC (2016). *Handbook of Steel Construction*. 11th Edition, Canadian Institute of Steel Construction.

Link:
https://www.amazon.ca/s?marketplaceID=A2EUQ1WTGCTBG2&me=A37AQRLU1UW5CJ&merchant=A37AQRLU1UW5CJ&redirect=true (promo code available, $108.45/$199.97)

Some References:

1. Gaylord, Gaylord and Stallmeyer, (1992). *Steel Structures*. 3rd Edition, McGraw-Hill, New York.
2. Salmon and Johnson, (1996). *Steel Structures: Design and Behaviour*. 4th Edition, HarperCollins College Publishers, New York.
3. Salmon, Johnson and Malhas, (2009). *Steel Structures: Design and Behaviour*. 5th Edition, Prentice Hall
4. Galambos, T.V., editor (1998). *Guide to Stability Design Criteria for Metal Structures*. 5th Edition, John Wiley & Sons, New York.
5. Oden, J.T. and Ripperger, E.A. (1980). Mechanics of Elastic Structures. 2nd Edition, McGraw-Hill
6. Ziemian, R.D. (2010). *Guide to Stability Design Criteria for Metal Structures*. 6th Edition, John Wiley & Sons, Inc., Hoboken, New Jersey.
7. Galambos, T.V. (1968). *Structural Members and Frames*. Prentice Hall, Eaglewood Cliffs.
8. Chen, W.F. and Lui, E.M., (1991). *Stability Design of Steel Frames*. CRC Press, Boca Raton.
9. Bleich, F. (1952). *Buckling Strength of Metal Structures*. McGraw-Hill, New York.
10. CISC (2014). *Moment Connections for Seismic Applications*. 2nd Edition, Canadian Institute of Steel Construction
11. Metten, A. and Driver, R. (2016). *Structural Steel for Canadian Buildings: A Designer's Guide*. 3rd Edition. Structured Solutions Inc.